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Research Paper No. 2006/136

Gender Earnings Differentials and Regional Economic Development in Urban China, 1988-97

Ying Chu Ng*

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Abstract

Gender earnings differentials in urban China by region and their changes during the first decade of economic reform are examined. It is found that the female–male earnings ratio increased during the early stage of reform. The male earnings premium, overall, showed an increasing trend in the later stage of reform. Decomposition of the gender earnings differential reveals that a relatively lower percentage of the differential could be explained by gender differences in productive characteristics in the fast growing regions and in regions with a rapid pace of reform. The cross-sectional results highlight the possible existence of gender discrimination, particularly in the later stages of economic reform and development. Both market competition and the effects of wage decentralization play a role in shaping the gender earnings differentials. Gender earnings differentials varied by region and over time, generally in tandem with the pace of economic reform and development. The decomposition of the over time changes in the earnings gap indicated that improvement in females' productive characteristics during the reform period constantly enhanced the earnings of females relative to those of males. The over time changes in the returns to females' characteristics, however, work to counter any narrowing of the gender earnings gap.

Keywords: gender earnings differentials, urban China, transitional economies

JEL classification: J7, J3, O0

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1 Introduction

With the introduction of economic reforms in China, females and males have for the first time experienced an earnings differential. Before the reforms, the socialist constitution guaranteed females and males equal rights in all aspects of life, including equal pay for equal work. This egalitarian ideology was expected to eliminate any wage discrimination against females, promote income equality among workers, and suppress wage dispersion due to differences in human capital characteristics. A culture of egalitarianism enforced relatively equal pay for males and females with similar productive characteristics, leading to a rather equal distribution of income (Meng and Kidd 1997; Meng and Miller 1995). Meng (2000) has shown that the gender wage gap up to the mid-1990s remained small.

Since the onset of subsequent reforms, local authorities and enterprises have had greater autonomy in wage setting. (For a brief discussion of the wage reforms, see Yueh 2004.) Jolliffe and Campos (2005) and Maurer-Fazio and Hughes (2002) have argued that the decentralization of remuneration decisions allowed managers to reward workers according to their productivity, and this, in turn, provided managers more freedom to engage in discriminatory practices. In short, the collapse of central planning has provided room for discrimination.

The transformation from a planned economy to a market economy involves the loosening of central control, and stimulates market competition through internal mechanisms (the relaxation of state control and the development of the private sector) and external influences (foreign competition through trade liberalization). The establishment of township and village enterprises (TVEs) created competition in the 1980s, then a burgeoning of foreign invested enterprises stimulated further competition in the 1990s (Gustafsson and Li 2000). In contrast to wage decentralization, competition can be considered a force tending to minimize discrimination. Becker (1971) has argued that market forces may result in less gender discrimination. Non-discriminatory employers would employ females who were as productive as males, and this would give them a lower cost of production than discriminatory employers. This is because employers who discriminate have to pay their favoured group (males) more than their marginal revenue product and their disfavoured group (females) less than their marginal revenue product. Thus, market competition can punish discriminatory wage setting behaviour, narrowing the gender earnings gap. Hellerstein *et al.* (2002), Jolliffe and Campos (2005), Liu *et al.* (2000), and Maurer-Fazio and Hughes (2002) have all propounded such arguments. The possibility of a reduction in the gender earnings gap resulting from market competition cannot, therefore, be neglected in China's transition economy.

Another feature of China's economic transition has been the uneven pace of economic reform across different regions. Faster economic reform in the east region is evidenced by the faster pace of privatization there, and the share of various types of enterprises in regional industrial output. A good indicator of privatization is the development of TVEs, which, in the east region, constituted half of the national total in 1988. The corresponding figures for the central and west regions were 35 per cent and 15 per cent, respectively. Although there had been more rapid development of TVEs in the inland (the central and west) regions by 1997, statistics from the *Chinese Statistical Yearbook*

(NBS various years) indicate that 40 per cent of the nation's TVEs were located in the east region in 1997. A similar picture can be drawn from the share of workers employed by TVEs between 1988 and 1997. Using figures from various *Chinese Statistical Yearbooks*, the share of state-owned enterprises (SOEs) in regional industrial output fell from 48 per cent to 19 per cent for the eastern provinces between 1988 and 1997. Although the reduction in this share in absolute terms was quite similar across regions, by 1997 this still left a share of about 31 per cent for the central region and as high as 44 per cent in the west. Collective enterprises, meanwhile, contributed 42 per cent of industrial output in the east region in 1988, 28 per cent in the central region, and 23 per cent in the west. By 1997, these figures had fallen into the 15 per cent to 20 per cent range in all regions. These falls in the contribution to industrial output from both state-owned and collective enterprises reflect the progress of privatization (the development of the private sector) in all regions, with the greatest expansion in the east.

Indicators of openness can be seen as supporting evidence of regional disparity in the pace of economic reform. No less than 85 per cent of the national trade volume was contributed by the eastern region between 1986 and 1998 (Zhang and Zhang 2003: table 2). Calculations derived from figures reported in various *Chinese Statistical Yearbooks* (NBS various years) indicate that trade as a share of the regional GDP in the eastern region was 28 per cent in 1988 and exceeded 50 per cent in the 1990s. Corresponding figures for the central and the inland regions were between 6 per cent and 10 per cent, and between 6 per cent and 9 per cent, respectively.

Another indicator of the pace of economic reform is the value of foreign direct investment (FDI) flowing into the regions. Between 1985 and the late 1990s, more than 80 per cent of the nation's FDI was in the eastern region (Zhang and Zhang 2003). The share of the central region was only 5-10 per cent, while the west shared only 3-5 per cent of the nation's FDI. Wang and Hu (1999) have pointed out that all special economic zones, open cities, customs-free zones, and the majority of economic and technological development zones established before the mid-1990s were located in the coastal (eastern) area.

These regional differences in the pace of economic reform generated an imbalance in growth across China's regions. The annual growth rates of GDP per capita for the east, central, and west regions have been 10 per cent, 8.4 per cent, and 7.4 per cent, respectively¹ (Bao *et al.* 2002). Studies of income inequality and regional disparity in China have concluded that regional disparities narrowed in the early stage of reform between 1978 and 1984, but by 1990, the gap between the coastal and inland regions was growing rapidly (Bao *et al.* 2002; Jian *et al.* 1996). A recent study by Kanbur and Zhang (2005) analyzed Chinese provincial inequality for the period 1952-2000 and concluded that provincial inequality in China has consistently risen since the reforms, and that a substantial inland-coastal inequality has existed since the late 1980s. Their findings are in line with the results of earlier studies indicating that regional disparity was strongly associated with the implementation of economic reforms (Gustafsson and Li 2000; Maurer-Fazio and Hughes 2002; Song *et al.* 2000; Zhang and Zhang 2003).

The issue of gender earnings differentials in China is thus complicated by this unbalanced regional growth in the Chinese economy. The focus of the present study is

1 Sub-period growth rates can be found in Démurger *et al.* (2002: table 5).

on the interplay of uneven regional growth and conflicting forces in the labour market (the decentralization of wage setting and the competitive market environment) in shaping the pattern of gender earnings differentials. Although the magnitude of the differentials cannot be predicted *a priori*, it is argued that the evolution of gender earnings differentials in the east region should be replicated in the two inland regions with a time lag as their economic reforms progress. This has important implications for regional labour markets in China in terms of attracting the skills necessary for economic development. Accordingly, the primary objective of the present study is to examine gender earnings differentials in China by region during the post reform period.

In an effort to improve on prior work reported in the literature, this study uses a series of ten-year cross-sectional national data sets (instead of a single cross-sectional data set or cross-sectional data sets from two different time periods) for analysis. Such a long series of data, together with the decomposition technique adopted, allows the pattern of gender earnings differentials by region to be traced over the course of regional development and economic transformation. To the best of our knowledge, such a comprehensive analysis of the Chinese data has not been done before.

The long data series also facilitates the investigation of gender earnings differentials by region over time. Based on the decomposition method of Wellington (1993), the regional gender earnings differentials were decomposed into changes in productivity-related characteristics over time, and changes over time in the returns to those characteristics. It is the latter component that provides the institutional context for earnings determination and explains the portion of the differentials due to changes in skill prices. This allows discussion of how the pace of economic reforms and economic development altered the market's valuations of skills in different regions. Such issues have not been addressed before in the Chinese context after more than a decade of reforms. With both cross-sectional and over time views, the present study provides an alternative approach to understanding gender earnings differentials in China during the post reform period.

2 Gender earnings differentials in China

Regardless of any variations in the data used for analysis, the urban female-male earnings ratio has been found to be about 0.80 in China between 1988 and 1995 (Gustafsson and Li 2000; Hughes and Maurer-Fazio 2002). This ratio then fell to 0.70 in 1999 (Yueh 2004). Similarly, female wages as a proportion of males' fell in all regions between 1988 and 1994 according to published national aggregate statistics on employee wages (Maurer-Fazio *et al.* 1999). Based on four data surveys of the Chinese Household Income Project, Appleton *et al.* (2005) found that the estimated gross gender differentials increased consistently between 1988 and 1999. That is, males earned 9.6 to 18.6 per cent more than females even after controlling for other demographic and productive characteristics.

Gender wage differentials in China are largely attributable to differences in the rewards to productive characteristics (the unexplained component). According to Liu *et al.* (2000), this component explained 80 per cent or more of the wage differentials among a Shanghai sample of females and males. On the other hand, as argued earlier, the rapid economic development brought on by economic reform has introduced competitive

market forces into the Chinese economy. Theoretical arguments suggest that competition should tend to eliminate discrimination by penalizing firms which discriminate. This effect has been confirmed by an empirical study using plant and firm data (Hellerstein *et al.* 2002). Classifying samples of females and males into market and non-market groups (as was done by Meng 1998) or by types of enterprise ownership (for example, Maurer-Fazio and Hughes 2002; Liu *et al.* 2000), has consistently shown that the discriminatory (unexplained) component of the gender wage differential was smaller than the explained component in more competitive sectors.

There have been only a handful of cross-sectional studies of gender earnings differentials in China, and the results reported in the literature have been mixed as to whether the economic transition has resulted in an improvement or deterioration of females' wages relative to males' (see the summary provided by Jolliffe and Campos 2005.) Accordingly, a more thorough and comprehensive analysis of gender earnings differentials in China is warranted. This is particularly important in China because, unlike other transitional economies such as that of Russia and those of Eastern Europe,² China's pace of economic reform has been rather gradual. With regional differences in the pace of economic reform and thus variations in regional growth, the magnitude of the two conflicting forces in the labour market (the decentralization of wage setting and the competitiveness of the market environment) would vary by region in China. Unlike previous work, the analyses of this study were designed to highlight the interplay between regional factors and the two conflicting forces in the Chinese labour market. The cross-sectional female–male earnings ratio, the gross gender earnings differentials, and the decomposition of gender earnings differentials by region were examined. These cross-sectional trends must underlie any study of temporal changes in gender earnings differentials by region.

3 Data and methodology

3.1 Data

The data used in this study were extracted from the Urban Household Surveys for 1988–92 and 1993–97 conducted by the Urban Socio-Economic Survey Organization of China's State Statistical Bureau. These two data series sample China's urban population. They are annual cross-sectional series. The surveys have consistently adopted a stratified, multi-stage, and systematic sampling method. Based on geographical location and the population structure, a total of 226 locations (cities and counties) are selected for surveying, ensuring a sample representative of the urban population. Within each selected location, the first-stage sampling unit is the street community, the second-stage sampling unit is the resident committee, and the third-stage sampling unit is the household. To enhance the validity of the samples, one-third of the households are replaced annually. In each survey, individual information such as employment status, the highest level of

2 For studies of gender earnings differentials in transitional economies, see Brainerd (1998, 2000), Gerry *et al.* (2004), Glinskaya and Mroz (2000), Katz (1997), Newell and Reilly (1996), and Ogloblin (1999) for Russia; Hunt (2002) for East Germany; Giddings (2002) and Jolliffe (2002) for Bulgaria; Orazem and Vodopivec (2000) for Estonia and Slovenia; Jolliffe and Campos (2005) for Hungary, and; Jurajda (2003) for the Czech Republic and Slovakia.

education attained, age, gender, years of working experience, sector of employment, occupation, and annual labour income are collected.

The first five-year series of the surveys is the most extensive Chinese data set in terms of its geographic coverage (covering 29 municipalities and provinces of China) and the number of households surveyed.³ There were 24,810 households included in the 1988 to 1991 surveys and 24,750 in 1992. The second five-year series covers only ten municipalities and provinces.⁴ In 1993, 6,134 households were included; in 1994 there were 6,292, while the 1995-97 surveys covered 6,300 households. In order to analyze a continuous series of data covering ten years, only data from the municipalities and provinces reported in both series were included in the analysis. In the second five-year series, data from the city of Chongqing are reported separately from those of Sichuan province. To be consistent with the classification of the first five-year series, the data for Chongqing in the second series were recombined in the analysis with those for Sichuan. The resulting nine municipalities and provinces were classified into three regions according to the official definition of the Chinese Statistical Yearbook. The east region consisted of Beijing, Jiangsu, Guangdong and Liaoning; Anhui, Shanxi and Hubei were grouped into the central region; and the west region comprised Sichuan (including Chongqing) and Gansu. Given that the data of both series were drawn from representative national samples, the results of any analysis of the selected nine municipalities and provinces should reasonably represent the region to which they belong.

For the purposes of the present study, in each year only data on working individuals aged between 16 and 60 (55 for females due to the difference in retirement ages) were analyzed. Workers in agriculture and fisheries and the self-employed were excluded from the analysis. Because no information on the hours worked was available, a worker's annual earnings⁵ was adopted as the dependent variable in the subsequent analysis. Variations in hours worked in China is not such a serious issue as it would be in a study of a more developed economy, so omitting working hours may not cause serious bias in the estimations.⁶ Only working individuals with positive earnings were included in the sample. The number of observations was 9,598, 8,229, 9,328, 8,926, and 11,802 in the 1988, 1989, 1990, 1991, and 1992 samples, respectively; while the number of observations for the 1993-97 samples were 11,101, 11,118, 10,971, 10,978, and 10,863. The detailed sample breakdown by gender and region is provided in Table 1.

3 The three municipalities are Beijing, Shanghai, and Tianjin. The provinces are Heilongjiang, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, and Tibet.

4 In this series, the only municipality is Beijing. There are eight provinces: Shanxi, Liaoning, Jiangsu, Anhui, Hubei, Guangdong, Sichuan, and Gansu. Chongqing is separated out from Sichuan as a stand-alone city.

5 Following the methods of Gustafsson and Li (2000), Hughes and Maurer-Fazio (2002), and Zhao (2002), earnings included basic salary, bonus, subsidies, and in-kind income related to work. To account for any effect of inflation or deflation, each year's earnings were deflated or inflated by the provincial GDP deflator (extracted from NBS 1999) for the corresponding year of the study period.

6 Based on the 1995 survey of the China Household Income Project (CHIP), Chen *et al.* (2005) found that differences in the average hours of work across different types of enterprise were statistically insignificant. Although they found that the effect of hours of work on the earnings of individuals in foreign enterprises was much stronger than that in state-owned and collective enterprises, the share of foreign enterprises in the Chinese labour market was still relatively small, even in the mid-1990s.

Table 1 Average earnings for males and females by region, 1988-97

Year	East region		Central region		West region	
	Males	Females	Males	Females	Males	Females
1988	1154.88 (2084)	967.89 (1984)	669.19 (1746)	555.82 (1619)	1196.79 (1109)	989.75 (1056)
1989	1208.24 (1820)	1024.12 (1673)	694.76 (1633)	577.23 (1551)	1257.00 (807)	1041.34 (745)
1990	1261.82 (2163)	1087.38 (2000)	711.79 (1632)	589.07 (1521)	1228.20 (1050)	1019.09 (962)
1991	1322.67 (1994)	1121.27 (1797)	760.81 (1604)	640.28 (1469)	1279.72 (1079)	1080.64 (983)
1992	1665.39 (2867)	1443.52 (2570)	913.58 (1899)	765.08 (1728)	1535.31 (1424)	1278.74 (1314)
1993	1719.58 (2802)	1455.55 (2531)	959.72 (1660)	789.01 (1498)	1550.38 (1363)	1276.68 (1247)
1994	2220.50 (2751)	1817.05 (2467)	1128.96 (1777)	918.17 (1595)	1797.39 (1328)	1483.49 (1200)
1995	2479.62 (2739)	2042.35 (2425)	1260.58 (1712)	1029.27 (1558)	1924.58 (1310)	1588.97 (1227)
1996	2627.14 (2667)	2159.69 (2361)	1254.92 (1762)	1026.20 (1572)	1880.79 (1350)	1597.64 (1266)
1997	3010.19 (2656)	2455.60 (2383)	1388.06 (1728)	1121.20 (1533)	2144.71 (1333)	1828.89 (1230)

Notes: Sample size is in parentheses. All earnings were inflated or deflated by their corresponding provincial GDP deflator.

3.2 Methodology

Estimating an earnings function by gender is the first step toward analyzing earnings differentials between males and females. As with other studies of developing countries,⁷ the logarithmic male ($\ln E^M$) and female ($\ln E^F$) earnings functions were assumed to take the following forms.

$$\ln E^M = \alpha^M + \beta^M X^M + \mu \quad (1)$$

$$\ln E^F = \alpha^F + \beta^F X^F + \varepsilon \quad (2)$$

where X^M and X^F represent vectors of various earnings determinants including personal characteristics such as level of education, actual years of working experience and place of residence, and job-related information (occupation, sector of employment, and the type of enterprise ownership). β^M and β^F are the corresponding vectors of estimated coefficients, while α^M and α^F are constant terms. μ and ε are random error terms. Both earnings functions were applied to each year's sample data by region for the period 1988-97.

The male versus female average earnings differential in a particular year for a particular region is

$$\ln \bar{E}^M - \ln \bar{E}^F = (\alpha^M + \beta^M \bar{X}^M) - (\alpha^F + \beta^F \bar{X}^F) \quad (3)$$

where $\ln \bar{E}^M$ and $\ln \bar{E}^F$ are the average logarithm of male and female earnings, respectively. $\bar{X}^M$ and $\bar{X}^F$ are the vectors of average earnings-determining (productivity-related) characteristics of the male and female samples, respectively.

The well-known decomposition procedure developed by Oaxaca (1973) splits the total gender earnings differentials (the left-hand side of Equation (3)) into two components. That is,

$$\ln \bar{E}^M - \ln \bar{E}^F = \beta^M (\bar{X}^M - \bar{X}^F) + [\bar{X}^F (\beta^M - \beta^F) + (\alpha^M - \alpha^F)]. \quad (4)$$

The first component (the first term on the right-hand side of the equality) is the differential attributable to gender differences in observable productivity-related characteristics, while the second component (the terms in the square bracket) is the earnings gap due to differences in the male and female returns to these productivity-related characteristics. It is this second component (the unexplained component) which is generally attributed to discrimination.

The decomposition can also be done using the female earnings structure (see Oaxaca 1973; Cotton 1988; Neumark 1988). Furthermore, one could argue that the decomposition methods proposed by Neumark (1988) or Cotton (1988) may also be

7 Gustafsson and Li (2000), Hughes and Maurer-Fazio (2002), Liu *et al.* (2000), Maurer-Fazio and Hughes (2002), and Meng (1998).

relevant. Studies of Jolliffe and Campos (2005), Maurer-Fazio and Hughes (2002), and Liu *et al.* (2000) are among the examples of studies taking this approach. Empirical studies of a similar issue in the Chinese economy have indicated that the results of any of these three approaches are comparable (Maurer-Fazio and Hughes 2002; Ng 2004). Nevertheless, a sensitivity check on these three decomposition approaches may be revealing. Full results with the three approaches (as shown in the tables of the Appendix) indicated that although the magnitude of the two components varied depending on the approach used, the temporal trend of the changes in the relative shares of the components was very similar with all three approaches. In particular, the overall pattern using the male wage structure as the non-discriminatory wage structure was more inclined to the results adopting the pooled male and female wage structure (a method proposed by Neumark 1988). To facilitate temporal analysis (see below), the approach outlined in Equation (4) was adopted.

To analyze changes in gender earnings differentials across time by region, the technique proposed by Wellington (1993) was adopted. Applying a concept similar to that of the Oaxaca one-period decomposition, the change in the earnings differential between time periods t and $t+a$ for a particular region is:

$$\begin{aligned}
& (\ln \bar{E}_{t+a}^M - \ln \bar{E}_t^M) - (\ln \bar{E}_{t+a}^F - \ln \bar{E}_t^F) \\
&= \left[\beta_{t+a}^M (\bar{X}_{t+a}^M - \bar{X}_t^M) - \beta_{t+a}^F (\bar{X}_{t+a}^F - \bar{X}_t^F) \right] + \\
& \left[\{(\alpha_{t+a}^M - \alpha_t^M) + \bar{X}_t^M (\beta_{t+a}^M - \beta_t^M)\} - \{(\alpha_{t+a}^F - \alpha_t^F) + \bar{X}_t^F (\beta_{t+a}^F - \beta_t^F)\} \right]. \quad (5)
\end{aligned}$$

The term in the first square bracket on the right-hand side represents the change in the earnings differential due to changes in the characteristics. The term in the second bracket reflects the portion of the change that can be explained by changes in the returns to the characteristics. An alternative, similar decomposition can be found in the work of Blau and Beller (1988), and Smith and Welch (1989). However, Wellington (1993) has pointed out that some of the components of the decomposition in these alternative methods have no clear interpretation. With no additional information to be gained, Equation (5) was chosen.

In handling changes in wages over time, one may argue that changes in the wage distribution could be a concern. Juhn *et al.* (1991; 1993) introduced an innovative method of decomposing residual wage differentials among groups of workers. Their decomposition method is based on percentile rankings. The residual differentials between groups are decomposed into changes in the difference in their mean percentile ranks (changes in the level of unmeasured skill) and changes in the dispersion of the residual wage distribution (changes in the returns to unmeasured skill). Unfortunately, this decomposition method has proven to be problematic. Suen (1997) has provided a detailed discussion of the issue. Statistically, he argued that, ‘the decomposition is unbiased only when percentile ranks are independent of the [residual wages] standard deviation’ (Suen 1997: 556). In fact, such independence may not hold in general, because if only the wage dispersion (‘price of skills’) changes would the gap in

percentile rank ('skill') change. Thus, the meaning of decomposing wage residuals would be lost. The method will produce a false impression that the 'unmeasured skill differentials' have declined while the 'skill price' has risen (and vice versa) if the wage distribution becomes more (less) dispersed. More important, the decomposition implicitly assumes that labour market discrimination is unimportant (Suen 1997: 558). This is rather against the original motivation of undertaking the decomposition. In sum, Suen (1997) concluded that the method proposed allowed no additional interpretation beyond that available with the standard model. The empirical results of Gustafsson and Li (2000) lent support to these theoretical arguments. Using the 1989 and 1996 Urban Household Income Surveys, they found that the increase in the gender earnings gap in urban China between 1988 and 1995 was driven by increased earnings inequality, instead of a deterioration in the relative position of females in the earnings distribution.

To provide a thorough understanding of the changes in the earnings differentials across regions, the ten-year period was subdivided into three sub-periods based on an observable cyclical pattern (see below). The three sub-periods were 1988-90, 1990-94, and 1994-97.

To summarize, the decomposition formula presented in Equation (4) was applied to the cross-sectional data by region so as to provide an overview of the gender earnings differentials across regions for the period 1988-97. The decomposition outlined in Equation (5) was then applied seeking to explain (i) the importance of changes in productivity-related characteristics, and that of changes in the returns to these characteristics in contributing to the change in gender earnings differentials over time by region, and (ii) the relative position of females and males in the reward system across regions during the reform period.

4 Empirical findings

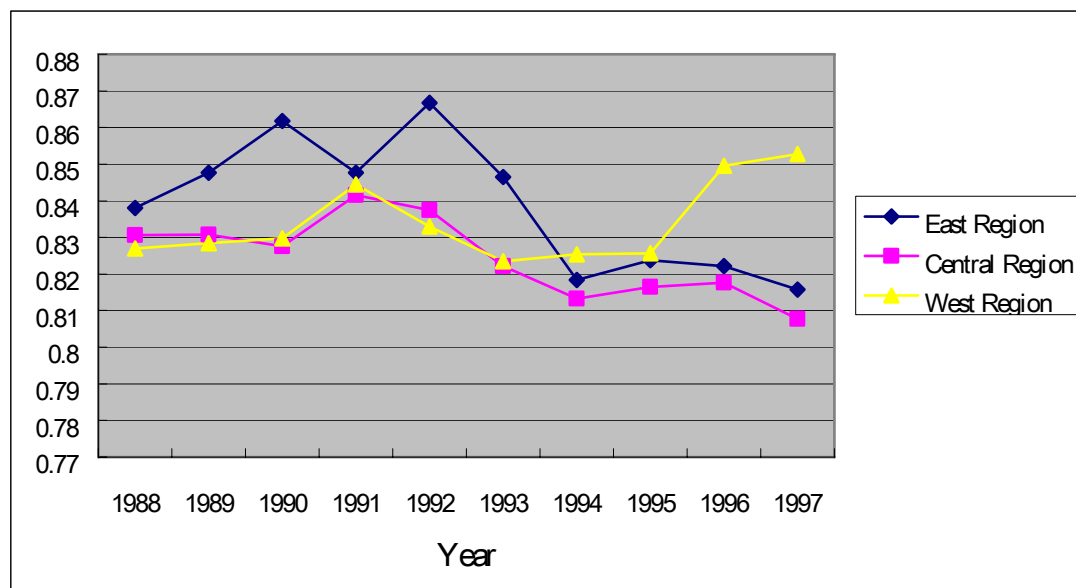
4.1 An overview of gender earnings

Regardless of region, males earned more than females during the entire period 1988-97 (Table 1). There were also regional differences in earnings growth during the reform period. The outstanding wage growth in the east region in the 1990s probably reflects economic reform policies biased towards the coastal area. To have a rough idea of gender earnings differences across regions, the female-male earnings ratio was computed with the information in Table 1. Figure 1 presents the female-male earnings ratios by region for the years 1988-97.⁸ In the east, the gender earnings gap narrowed in the late 1980s, but it widened in the 1990s and at an accelerating rate after 1992. A declining trend in the female-male earnings ratio was also present in the central region starting in the early 1990s. However, the female-male earnings gap in the central region never exceeded that in the east. This is particularly the case when the earnings gap in the east was improving during the late 1980s and early 1990s. These observations probably reflect the differing pace of reforms and regional development differences.

8 The ratios ranged between 0.82 and 0.87 for the east region, while less variation was found in the central region (0.81 to 0.84) and the west (0.82 to 0.85).

During the period 1980-94, the real GDP of the east region grew 11.5 per cent annually on average, while the rate in the west was 9.4 per cent (Sun and Chai 1998). In terms of the annual growth rate of GDP per capita, it was 10 per cent, 8.4 per cent, and 7.4 per cent for the east, central, and west regions respectively (Démurger *et al.* 2002). The regional pattern of female–male earnings ratios is also consistent with the degree of openness by region presented earlier.

Figure 1 The female–male earnings ratios by region, 1988-97

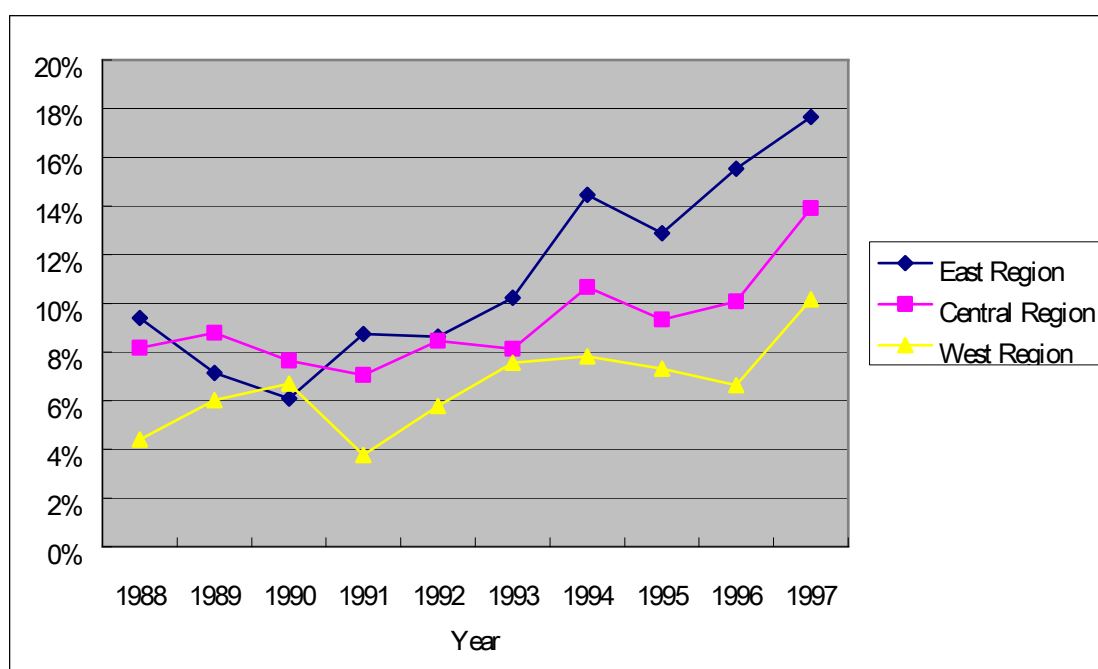


Source: Computed from the figures presented in Table 1.

This discussion of female–male earnings ratios has so far taken no account of productivity-related characteristics affecting the earnings of an individual. For a more systematic examination, an estimation of the earnings function for the full sample of individuals for each year by region with the inclusion of a gender dummy variable (MALE) is called for. Making references to previous work and the data available in the Urban Household Surveys, standard human capital and demographic variables were included in the earnings function. Education was categorized into levels, with ‘primary level and below’ as the reference group. Working experience and its square were used to control for the concavity of the earnings profile. The earnings functions also controlled for job related factors such as occupation, industry, and the type of enterprise ownership. Within each region, province dummy variables were constructed to reflect pay variations among the provinces. The estimated coefficients for the MALE variable, the gross gender earnings premium by region for the period 1988-97⁹ are presented in Figure 2.

9 Given the fact that the focus was on the gender dummy variable, the estimation results for the full sample by year and region are not discussed in detail but can be obtained from the author on request.

Figure 2 The gross gender earnings premium by region, 1988-97



Source: The figures are the estimated coefficients of the MALE variable in the full sample estimation.

In line with the results of previous studies, males earned more than females even after controlling for personal and job-related characteristics. There was a declining trend in the male earnings premium in the east region until 1990, and the premium then increased again in the later years (Figure 2). For the central region, the improvement in the gender earnings gap extended into the early 1990s, but an increase in the male earnings premium has been seen since 1992. A decline in the male earnings premium in the west came only in the early 1990s, while a widening premium was then found between 1993 and 1997. The changes in the male premium over time across regions, again, imply that gender earnings differentials varied during the course of economic reform and development.

One possible interpretation of these observations would be that in the early stages of reform, the effect of the competitive environment dominated, and returns to skills were relatively appropriate, so the gender earnings differentials remained small. With further reforms, the decentralization of wage setting allowed room for discriminatory practices, and the differentials widened. Because the pace of reform lagged in the non-coastal areas, the improvement in gender earnings differentials in the non-coastal provinces can be seen only towards the latter part of the 1990s.

4.2 The decomposition of gender earnings differentials

To examine gender earnings differentials by region, the sample of individuals by region for each year was subdivided into sub-samples of males and females. The earnings

function of each regional sub-sample for each year was then estimated by applying Equations (1) and (2).¹⁰ Taking the same specification as the full sample earnings function but without the gender variable, the estimated variables were of the expected sign. Education was found to be more important in influencing the earnings of females than of males in all regions. As expected, the higher the education level, the more a worker earned. The returns to education were relatively lower in the central region. The returns to education were, on the other hand, relatively higher for females in the west region than for females in the east. This might be attributable to a scarcity of human capital in the remote inland provinces. In line with human capital theory, the earnings profiles of both males and females were concave, with slightly higher concavity for the males. Consistent with the stage of economic reform and development, there was an obvious decline in the returns to experience, with an increasing trend in the returns to education. This phenomenon was most pronounced in the east region. As for job related factors, occupations that demanded higher skill levels tended to pay more, and enterprise ownership significantly affected an individual's earnings. Pay also varied with industrial sector, and within each region, provincial earnings differentials were found. Using the estimated coefficients and their corresponding sample means, the earnings differential between the gender groups by region was calculated for each year according to Oaxaca's (1973) method, as outlined in Equation (4). The computed explained and unexplained components are demonstrated in Figures 3 and 4, respectively.

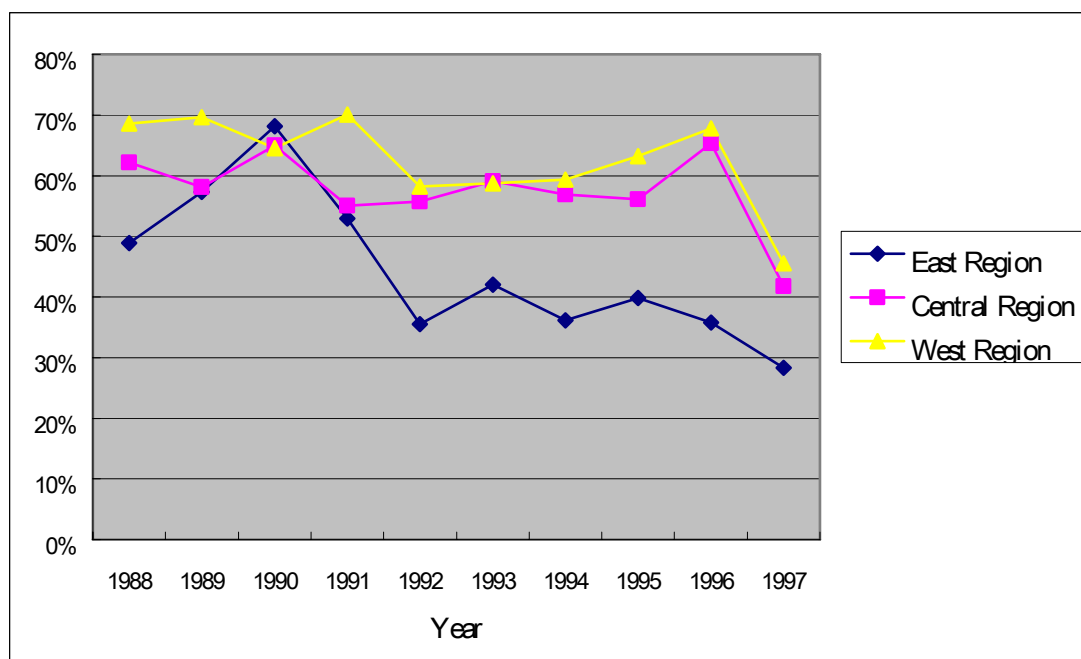
With respect to the role played by productive characteristics (the explained component) in explaining the gender earnings differentials, the contribution was no less than 55 per cent, with the exception of the east region in the 1990s and the other two regions in 1997 (Figure 3). Another observation is that across regions, the explained component was relatively more important in explaining the gender earnings differentials in the west region over the study period (Figures 3 and 4). In other words, differentials due to discrimination and unmeasured skills have been most serious in the east, followed by the central region in the post reform period.

Because of the vast development that has taken place and the coastal-led economic reform policies, it is not surprising that discrimination may have grown in the east region since the early 1990s. Flexibility in wage setting gave employers room to manipulate pay between gender groups even in a relatively competitive market environment. Such manipulation did not come until the late 1990s in the central and west regions, where economic reforms and development have lagged behind the east region over the years. According to the survey of wage reform discussed by Yueh (2004), not until the early 1990s were enterprises allowed to set their internal wage structure, which was then strongly linked to the performance of the enterprise. By the mid-1990s, publicly listed companies (mostly of which were not SOEs) had adopted their own wages systems. According to statistics mentioned earlier, the importance of SOEs (measured in terms of their share of industrial output) fell substantially in the east region in the early 1990s. For the central region, about 60 per cent of the region's industrial output was still contributed by SOEs in the early 1990s. The corresponding figure remained as high as 44 per cent for the west region even in the late 1990s. Thus, the relative importance of the unexplained

10 The regression results of the earnings function by gender across regions for each year are not reported here. The R-square of the regression results was found to be acceptable, ranging between 0.25 and 0.59. The details, along with the sample statistics by gender and region, are available from the author.

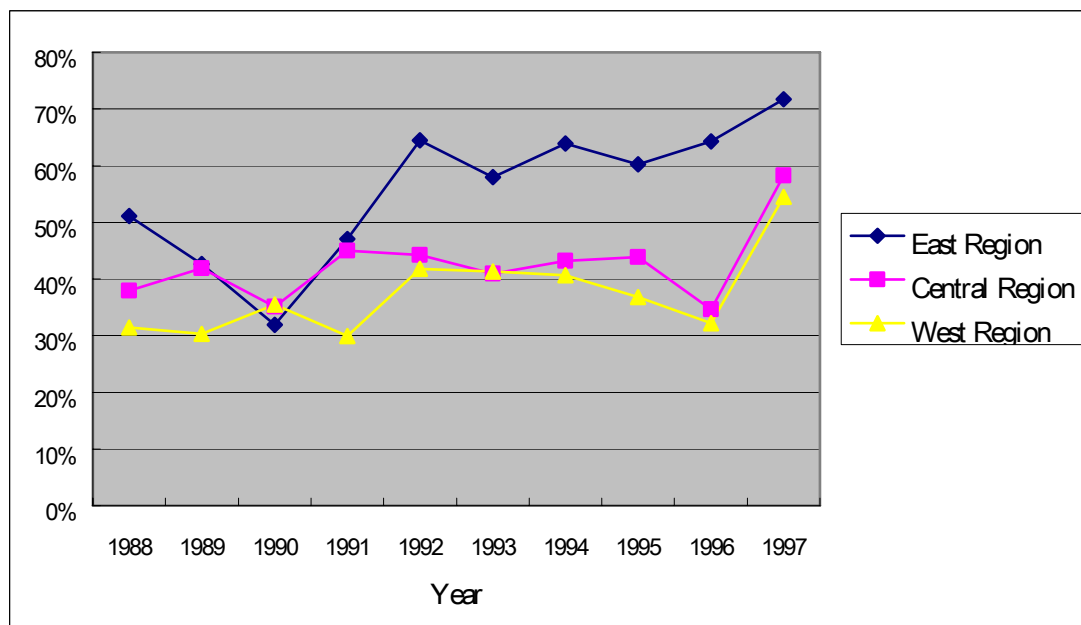
component in the central and west regions only developed in the later years of the reform period, indicating that they were catching up in terms of economic development.

Figure 3 The contribution of the explained component to the total gender earnings differential by region, 1988-97



Source: The figures are those presented in Appendix Tables A1-A3.

Figure 4 The contribution of the unexplained component to the total gender earnings differential by region, 1988-97



Source: The figures are those presented in Appendix Tables A1-A3.

4.3 Changes in gender earnings differentials

Blau and Khan (1994) have argued that females are disadvantaged during the process of economic transition. But in a later study, Kahn (1996) stated that females could share the benefits of reform, but that their share could be proportionately more or less than that of males. To see how these arguments are applicable to China during its first decade of economic reform in light of the imbalances in regional growth and the conflicting forces existing in the labour market, changes in gender earnings differentials over time by region were calculated for the periods 1988-90, 1990-94, and 1994-97 using the approach outlined in Equation (5). Table 2 presents the overall results, as well as the computed decomposition components by region for the selected periods. A negative value indicates an improvement in the gender earnings differentials.

The larger absolute values of the overall changes found in the east region as compared to those in the central region reflect the differences in the pace of economic reform and regional development between these two regions (Table 2). Nevertheless, before 1991, competitive market forces dominated, leading to an improvement in the gender earnings differentials (the negative value for the overall changes). When the effect of wage decentralization started to take over, the deterioration in the gender earnings differentials (the positive value of the overall changes) became obvious for the periods 1990-94 and 1994-97. Development in the west, meanwhile, was far behind. The wave of economic reforms did not hit the inland provinces until the late 1990s (the negative values for the overall changes between 1994 and 1997 shown in Table 2).

The overall changes in gender earnings differentials were decomposed into the changes in the differences attributable to productivity-related characteristics (component (a)-(b)) and the changes attributable to differences in the wage structure (component (c)-(d)). From Table 2, the larger absolute values for (c)-(d) in all regions reflects the relative importance of the changes in the differences in wage structure in contributing to the overall differences. This was much more obvious in the east and central regions, supporting the idea that transforming from a planned economy to a more competitive economy led to productive characteristics being more appropriately rewarded.

The trends in components (a)-(b) and (c)-(d) by region reveal the changing role of competitive labour market forces and that of decentralization in wage setting. In the east, the increasingly competitive labour market enhanced the productivity-related characteristics of females as well as the rewards to those characteristics (positive component (a) and component (d) in panel A of Table 2), resulting in a narrowing of gender earnings differentials in the late 1980s. However, the wage decentralization effect that promoted discriminatory practices was so strong that widening of the gender differentials was evidence in the 1990s. This was particularly the case between 1990 and 1997 (the negative value of component (a)-(b) is outweighed by the positive value of component (c)-(d)).

In the central region the overall pattern of changes for the three sub-periods was similar to that in the east. However, due to differences in the pace of economic reform and regional development, the improvement in the gender earnings differentials resulting from competitive labour market forces (the negative value of component (a)-(b) in panel B of Table 2) remained quite strong in the central region in the early 1990s. As compared to the east region, the relatively slower pace of development in the latter

period suppressed the effect of wage decentralization (0.0595 versus 0.0825 for component (c)-(d)), leading to smaller gender earnings differentials.

Table 2
Overtime changes in gender earnings differentials and their decomposition by region, 1988-97

A. East region	1988-1990	1990-1994	1994-1997
Over-all changes	-0.0380	0.0525	0.0751
(a) Over time differences in males' characteristics	0.0022	0.0829	0.0100
(b) Over time differences in females' characteristics	0.0151	0.1086	0.0174
– (b)	-0.0129	-0.0257	-0.0074
(c) Over time differences in the returns to males' characteristics	0.0860	0.4210	0.3232
(d) Over time differences in the returns to females' characteristics	0.1111	0.3428	0.2407
– (d)	-0.0251	0.0782	0.0825
B. Central region			
Over-all changes	-0.0015	0.0399	0.0642
(a) Over time differences in males' characteristics	0.0075	0.0808	0.0293
(b) Over time differences in females' characteristics	0.0253	0.1164	0.0246
– (b)	-0.0178	-0.0356	0.0047
(c) Over time differences in the returns to males' characteristics	0.0740	0.3595	0.2127
(d) Over time differences in the returns to females' characteristics	0.0577	0.2840	0.1532
(c) – (d)	0.0163	0.0755	0.0595
C. West region	1988-1990	1990-1994	1994-1997
Over-all changes	0.0504	-0.0095	-0.0392
(a) Over time differences in males' characteristics	0.0717	0.0145	0.0343
(b) Over time differences in females' characteristics	0.0499	0.0699	0.0522
– (b)	0.0218	-0.0554	-0.0179
(c) Over time differences in the returns to males' characteristics	0.0035	0.3427	0.1083
(d) Over time differences in the returns to females' characteristics	-0.0251	0.2968	0.1296
(c) – (d)	0.0286	0.0459	-0.0213

Note: The figures were computed using Equation (5). '(a)-(b)' is the first decomposition component, while '(c)-(d)' is the second decomposition component.

As hypothesized, an improvement in gender earnings differentials in the west did not come along until the mid-1990s. The underlying reason for these improvements may have been relative improvements in females' productive characteristics over time (a larger value of component (b) as compared to component (a) in panel C of Table 2). With the more competitive market environment brought by economic reforms and the opening up of the inland provinces, more appropriate rewards to females' productivity-related characteristics (component (c)-(d)) became prevalent in the 1994-97 sub-period, enforcing the improvement in the gender earnings differentials. In sum, the experience of the west region during these sub-periods replicated the experience of the east and central regions with a time lag.

5 Conclusions

Average female and male earnings and the crude measure of gender earnings differentials all indicated a consistent male earnings premium in all regions of China during 1988-97. The Oaxaca decomposition of gender earnings differentials by region and year revealed that in the early stage of reform, the 'competition' effect overrode the 'decentralization' effect, such that there was a decrease in gender earnings differentials. With further economic development and a greater pace of economic reform, decentralization in wage setting undermined the 'competition' effect, resulting in growing differentials. The growth of the discriminatory (unexplained) component by region tracked the pace of regional reform and was consistent with the imbalances in regional growth during the post-reform period. The analysis of the decomposition of the trends in gender earnings differentials over time provides further supportive evidence of a regional pattern of differentials that matches the pattern of regional reform and imbalances in regional growth. That is, the differentials worsened in the faster growing east and the central regions in the late 1990s then in the west.

With the growing importance of the discriminatory component in the cross-sectional results and the temporal pattern of the gender earnings differentials, one would expect the differentials in urban China to grow continuously as China becomes more and more similar to OECD countries. Again, the growth in the differentials will probably be more pronounced in the east, followed by the inland regions. Although discrimination cannot be totally eliminated in any economy, to minimize its economic costs governments need to legislate equal pay or gender equality in the workplace. Such measures may be easier to implement in remote regions where the discriminatory practices attendant on wage decentralization have not yet taken hold due to persisting under-development.

The cross-sectional and over-time decomposition of gender earnings differentials (Figures 3 and 4, and Table 2) highlight the differences in endowments and the returns to those endowments by region. In particular, the returns to characteristics work as a major driving force for earnings differentials by gender and region. The sample statistics of Table 1 can be read as evidence of regional earnings differentials and thus regional inequality, particularly between the east and central regions, and particularly in the early 1990s. These observations suggest that inter-regional inequality can be seen as a by-product of different wage setting contexts and variations in the pace of economic reform. With continuous growth in the Chinese economy and the persistent regional differences in the pace of growth, regional wage differentials and inequality are to be expected. Social instability might even result in the long run. To minimize any potential

social problems, the Chinese government should switch away from the existing coastal-led growth policy and better promote growth in the inland regions.

An issue associated with any persistence of regional inequality is the mobility of labour. If the Chinese labour market allowed labour mobility, one could foresee a serious brain drain from less developed regions such as the west. Yet, a shortage of skilled labour already hinders the growth of the inland regions. This, in turn, accelerates regional inequality, as can be seen in the results of this study. Measures to ensure equal pay for equal work would seem to be essential before China can risk labour market liberalization.

The variations in discriminatory practices among the regions could have interesting implications for doing business in different locations. The greater gender differentials in the east tend to raise the costs of production. Unless very high profit margins are available, competitive forces (as argued by Becker 1971), should act to push discriminatory employers out of business. Foreign investors, for example, may find the region less attractive. At the same time, a strong incentive to invest in less-developed regions will result, hindering further growth in the more developed regions. Appropriate rewards to workers thus seem to be important to maintain business competitiveness as well as the growth of a region.

In this study, it was possible to assemble a relatively long data series by restricting the sample to nine municipalities and provinces. Given that the information was extracted from national data sets, the generalization of the results from the restricted sample may not be an issue. However, with no information on hours worked, and no proxy for unobservable abilities and unmeasured skills, the present study was only able to provide an analysis of the lower bound on gender earnings differentials. It is well known that the private sector in China has been growing enormously since the late 1990s and that the private sector is more market-oriented. With the opening up of the inland regions since the late 1990s and with continuing growth in the coastal region, patterns in the gender earnings gap in more recent years probably deviate from those found in this study. Further study of these issues with more up-to-date data is called for.

Appendix

Table A1
The decomposition of gender earnings differentials by region using Equation (4), 1988-97

Year	East region		Central region		West region	
	Explained component	Unexplained component	Explained component	Unexplained component	Explained component	Unexplained component
1988	48.87	51.13	62.11	37.89	68.60	31.40
1989	57.34	42.66	58.14	41.86	69.67	30.33
1990	68.14	31.86	64.93	35.07	64.54	35.46
1991	52.91	47.09	55.00	45.00	70.06	29.94
1992	35.55	64.45	55.73	44.27	58.22	41.78
1993	42.00	58.00	59.08	40.92	58.70	41.30
1994	36.12	63.88	56.84	43.16	59.36	40.64
1995	39.79	60.21	56.11	43.89	63.24	36.76
1996	35.76	64.24	65.36	34.64	67.77	32.23
1997	28.29	71.71	41.76	58.24	45.55	54.45

Table A2 The decomposition of gender earnings differentials by region using female wage structure as the non-discriminatory wage structure, 1988-97

Year	East region		Central region		West region	
	Explained component	Unexplained component	Explained component	Unexplained component	Explained component	Unexplained component
1988	48.70	51.30	42.49	57.51	63.77	36.23
1989	48.70	51.30	54.99	45.01	45.67	54.33
1990	61.24	38.76	64.66	35.34	61.46	38.54
1991	41.60	58.40	56.11	43.89	57.10	42.90
1992	25.84	74.16	50.18	49.82	63.69	36.31
1993	42.20	57.80	50.98	49.02	54.42	45.58
1994	41.45	58.55	44.68	55.32	67.00	33.00
1995	36.32	63.68	47.90	52.10	67.37	32.63
1996	31.98	68.02	56.81	43.19	74.97	25.03
1997	37.90	62.10	37.81	62.19	46.99	53.01

Table A3 The decomposition of gender earnings differentials based on the Neumark (1988) method, 1988-97

Year	East region		Central region		West region	
	Explained component	Unexplained component	Explained component	Unexplained component	Explained component	Unexplained component
1988	59.34	40.66	61.46	38.54	69.56	30.44
1989	58.67	41.33	62.46	37.54	65.56	35.44
1990	74.58	25.42	76.14	23.86	65.48	34.52
1991	69.46	30.54	62.28	37.72	71.24	28.76
1992	34.17	65.83	63.55	36.45	71.49	28.51
1993	42.61	57.39	63.79	36.21	64.21	35.79
1994	44.92	55.08	62.62	37.38	60.66	39.34
1995	44.93	55.07	56.36	43.64	61.92	38.08
1996	40.90	59.10	70.47	29.52	74.62	25.38
1997	35.97	64.03	43.93	56.07	54.37	45.63

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